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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/701,969	12/06/2000	Ka Lok Ng		9822

7590 02/24/2004

Law offices of William H Holt  
Unit 2 First Floor  
1423 Powhatan Street  
Alexandria, VA 22314

EXAMINER

MCHENRY, KEVIN L

ART UNIT	PAPER NUMBER
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1725

DATE MAILED: 02/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/701,969

Applicant(s)

NG ET AL.

Examiner

Kevin L McHenry

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 10-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10, 11 and 18 is/are rejected.
- 7) ☒ Claim(s) 12-17 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 December 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_.

### ***Drawings***

1. Figures 1 and 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Specification***

2. The disclosure is objected to because of the following informalities:

The specification lacks headings, such as "Background of the Invention", "Summary of the Invention", "Brief Description of the Drawings", and "Detailed Description of Preferred Embodiments".

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 10 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by De Palma et al. (U.S.P. 3,685,972).

De Palma et al. teach a reactor that includes a cylindrical reactor chamber with an

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inlet port and an outlet port, a hollow cylindrical gas permeable bed of catalyst within and coaxial with the reactor chamber, and an annular space between the outside of the bed and the inside of the reactor chamber. The width of the annular space decreases continuously along the length of the annular space. The end of the annular space opposite the inlet is closed and the outlet from the reactor is a central hole that has the same diameter as an inner coaxial chamber (see U.S.P. 3,685,972; particularly Figure 1; column 1, lines 13-21; column 2, lines 24-44; column 4, lines 61-75; column 5, lines 1-65; column 6, lines 2-10; column 7, lines 10-50).

5. Claims 10 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Hamblin (U.S.P. 3,380,810).

Hamblin teaches a reactor that includes a cylindrical reactor chamber with an inlet port and an outlet port, a hollow cylindrical gas permeable bed of catalyst within and coaxial with the reactor chamber, and an annular space between the outside of the bed and the inside of the reactor chamber. The width of the annular space decreases continuously along the length of the annular space. The end of the annular space opposite the inlet is closed and the outlet from the reactor is a central hole that has the same diameter as an inner coaxial chamber (see U.S.P. 3,380,810; particularly Figure 5; column 1, lines 18-23; column 5, lines 30-47).

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over De Palma et al. (U.S.P. 3,685,972) as applied to claims 10 and 11 above, and further in view of Yamamoto (U.S.P. 5,843,288) or Birmingham et al. (U.S.P. 4,954,320).

The former reference teaches the reactor taught above in section 4. However, De Palma et al. do not teach the use of inner and outer electrodes to form a plasma bed.

Yamamoto and Birmingham et al. teach processes of purifying gas streams by using plasma beds that are contained between coaxial electrodes. The bed is constrained between the electrodes by transverse supports at the ends of the electrodes. Yamamoto teach that such a process is useful for decomposing toxic compounds using non-thermal plasma so that by-products of the decomposition reaction are eliminated within a single-staged reactor (see U.S.P. 5,843,288; particularly Figure 4; column 1, lines 10-14; column 2, lines 4-8; column 8, lines 53-64). Birmingham et al. teach that the method can process aerosols and control plasma air by-product formation (see U.S.P. 4,954,320; particularly column 4, lines 15-30, 42-55; column 5, lines 6-13).

It would have been obvious to one of ordinary skill in the art at the time that the applicant's invention was made to have modified the reactor described above by the teachings of Yamamoto or Birmingham et al. One would have been motivated to do so to provide a process that is useful for decomposing toxic compounds using non-thermal plasma so that by-products of the decomposition reaction are eliminated within a

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single-staged reactor, as taught by Yamamoto, or to provide a process that can process aerosols and control plasma air by-product formation, as taught by Birmingham et al.

8. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hamblin (U.S.P. 3,380,810) as applied to claims 10 and 11 above, and further in view of Yamamoto (U.S.P. 5,843,288) or Birmingham et al. (U.S.P. 4,954,320).

The former reference teaches the reactor taught above in section 5. However, Hamblin does not teach the use of inner and outer electrodes to form a plasma bed.

Yamamoto and Birmingham et al. teach processes of purifying gas streams by using plasma beds that are contained between coaxial electrodes. The bed is constrained between the electrodes by transverse supports at the ends of the electrodes. Yamamoto teach that such a process is useful for decomposing toxic compounds using non-thermal plasma so that by-products of the decomposition reaction are eliminated within a single-staged reactor (see U.S.P. 5,843,288; particularly Figure 4; column 1, lines 10-14; column 2, lines 4-8; column 8, lines 53-64). Birmingham et al. teach that the method can process aerosols and control plasma air by-product formation (see U.S.P. 4,954,320; particularly column 4, lines 15-30, 42-55; column 5, lines 6-13).

It would have been obvious to one of ordinary skill in the art at the time that the applicant's invention was made to have modified the reactor described above by the teachings of Yamamoto or Birmingham et al. One would have been motivated to do so to provide a process that is useful for decomposing toxic compounds using non-thermal plasma so that by-products of the decomposition reaction are eliminated within a

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single-staged reactor, as taught by Yamamoto, or to provide a process that can process aerosols and control plasma air by-product formation, as taught by Birmingham et al.

### ***Allowable Subject Matter***

9. Claims 12-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter: the instant application is considered to be a nonobvious improvement over the inventions of De Palma et al. (U.S.P. 3,685,972) and Hamblin (U.S.P. 3,380,810). The improvements comprise at least one discontinuous decrease in the width of the annular space along its length and a first portion of the reactor chamber having at least one axially extending expansion chamber.

### ***Conclusion***

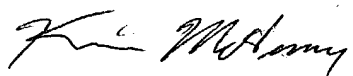
11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Perga et al. (U.S.P. 3,649,215), Betz (U.S.P. 3,817,716), Gandhi et al. (U.S.P. 3,920,404), Fratzler et al. (U.S.P. 4,385,032), Frost et al. (U.S.P. 4,419,108), Steenackers (U.S.P. 5,531,968), and Steenackers et al. (U.S.P. 5,593,645) are cited of interest for illustrating the state of the art in reactor design.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin L McHenry whose telephone number is (571) 272-1181. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas G Dunn can be reached on (571) 272-1171. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Kevin McHenry

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